

## CLAIMS

### WHAT IS CLAIMED IS:

1. A method for determining the severity of brain function impairment in a person due to an insult to said brain such as mild traumatic brain injury, aging or intoxication, 5 comprising the steps of:

- (a) determining a processing time value of said person in accordance with an elapsed time between a stimulus applied to said person and a response to said stimulus provided by said person, wherein said processing time value is representative of said impaired brain function;
- (b) providing electrical signals in accordance with said processing time value, whereby said electrical signals are representative of said impaired brain function;
- (c) performing mathematical operations upon said electrical signals to provide a processing time index; and
- (d) determining said severity of said brain function impairment in accordance with said processing time index.

2. The method for determining the severity of brain function impairment in a person 20 of Claim 1, comprising the further step of determining concussion severity in accordance with said processing time index.

3. The method for determining the severity of brain function impairment in a person of Claim 2, comprising the further step of determining said severity of said brain function 25 impairment using pupillometry.

4. The method for determining the severity of brain function impairment in a person of Claim 3, comprising the further step of determining said severity of said brain function impairment using a hand held pupillometer.

5. The method for determining the severity of brain function impairment in a person 30 of Claim 2, comprising the further steps of:

- (a) applying a visual stimulus to said person; and

- (b) determining said severity of said brain function impairment in accordance with said visual stimulus.

6. The method for determining the severity of brain function impairment in a person of Claim 2, comprising the further steps of:

- 5 (a) applying an audio stimulus to said person; and  
(b) determining said severity of said brain function impairment in accordance with said audio stimulus.

7. The method for determining the severity of brain function impairment in a person of Claim 6, comprising the further steps of:

- 10 (a) applying a visual stimulus to said person; and  
(b) determining said severity of said brain function impairment in accordance with both said audio stimulus and said visual stimulus.

8. The method for determining the severity of brain function impairment in a person of Claim 7, comprising the further steps of:

- 15 (a) applying a somatosensory stimulus to said person; and  
(b) determining said severity of said brain function impairment in accordance with said audio stimulus, said visual stimulus and said somatosensory stimulus.

20 9. The method for determining the severity of brain function impairment in a person of Claim 2, comprising the further steps of:

- (a) applying a somatosensory stimulus to said individual; and  
(b) determining said severity of said brain function impairment in accordance with said somatosensory stimulus.

25 10. The method for determining the severity of brain function impairment in a person of Claim 5, comprising the further steps of:

- (a) determining a response to said visual stimulus from said person; and  
(b) determining said processing time value in accordance with a time elapsed 30 between the time of said applying of said visual stimulus to said person and the time of said determining of said response to said visual stimulus.

11. The method for determining the severity of brain function impairment in a person  
of Claim 6, wherein the step of determining said processing time comprises the further steps of:

- 5           (a) determining a response to said audio stimulus from said person; and  
             (b) determining said processing time value in accordance with a time elapsed  
                 between the time of said applying of said audio stimulus to said person  
                 and the time of said determining of said response to said audio stimulus.

12. The method for determining the severity of brain function impairment in a person  
10 of Claim 10, comprising the further steps of:

- 15           (a) applying an unfilled geometric shape to said person;  
             (b) applying a filled geometric shape to said person ;  
             (c) determining a response to said filled geometric shape from said person;  
                 and  
             (d) determining said processing time value in accordance with a time elapsed  
                 between said applying of said filled geometric shape to said person and  
                 the time of said determining of said response to said filled geometric  
                 shape.

13. The method for determining the severity of brain function impairment in a person  
20 of Claim 12, comprising the further steps of:

- 25           (a) applying a first plurality of unfilled geometric shapes to said person;  
             (b) applying a second plurality of filled geometric shapes to said person  
                 wherein said second plurality is smaller than said first plurality;  
             (c) determining a response to said applying of said second plurality of filled  
                 geometric shapes; and  
             (d) determining said processing time value in accordance with a time elapsed  
                 between said applying of said second plurality of filled geometric shapes  
                 to said person and said response to said applying of said second plurality  
                 of geometric shapes.

30           14. The method for determining the severity of brain function impairment in a person  
                 of Claim 9, comprising the further steps of:

- (a) determining a response to said somatosensory stimulus from said person; and
- (b) determining said processing time value in accordance with a time elapsed between said applying of said somatosensory stimulus and said response to said somatosensory stimulus.

5        15. The method for determining the severity of brain function impairment in a person of Claim 2, comprising the further step of determining said processing time value in accordance with a tracking of the motion of a moving target by said person.

10      16. The method for determining the severity of brain function impairment in a person of Claim 15, comprising the further step of determining said processing time value in accordance with the ability of said person to track said motion of said moving target with a cursor controlled by a manual control device when said moving target is displayed on a video display.

15      17. The method for determining the severity of brain function impairment in a person of Claim 15, wherein said motion of said moving target comprises a step function stimulus having a predicted response and an elicited response from said person.

18. The method for determining the severity of brain function impairment in a person of Claim 17, wherein said elicited response comprises a damped oscillatory response.

20      19. The method for determining the severity of brain function impairment in a person of Claim 18, comprising the further step of determining a delay time value in accordance with said damped oscillatory response.

25      20. The method for determining the severity of brain function impairment in a person of Claim 19, comprising the further step of determining a rise time value in accordance with said damped oscillatory response.

21. The method for determining the severity of brain function impairment in a person of Claim 20, comprising the further step of determining said processing time value in accordance with said delay time value and said rise time value.

22. The method for determining the severity of brain function impairment in a person of Claim 16, comprising the further steps:

- (a) disposing said cursor within said target
- (b) applying a forcing function to said target to cause said target to move on said display;
- 5 (c) instructing said person to use said manual control device to move said cursor on said display and maintain said cursor within said moving target while said target is in motion; and
- (d) determining said processing time value in accordance with the amount of time said person maintains said cursor within said moving target.

23. The method for determining the severity of brain function impairment in a person  
10 of Claim 2, comprising the further step of comparing said processing time index with a value representative of a population norm.

24. The method for determining the severity of brain function impairment in a person  
of Claim 23, comprising the further step of determining a status of said person in accordance  
15 with said comparing.

25. The method for determining the severity of brain function impairment in a person  
of Claim 2, comprising the further step of comparing said processing time value with a previous  
processing time value of said individual.